

# **The Supply of DATA-waivered Providers and Opioid Treatment Programs for Medication-Assisted Treatments in Ohio**

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## **Introduction**

The rise in drug-related mortality rates in the United States has been especially concerning<sup>1</sup>. Ohio is among the top states experiencing an increase in mid-life mortality with one driving factor being the opioid crisis<sup>1</sup>. In the last two decades, the overall drug overdose rate in Ohio increased nine-fold compared to the national average increase of three-fold<sup>2</sup>. In 2018, Ohio was among the top 5 states for the highest mortality rates due to drug overdoses with 35.9 deaths per 100,000, compared to a national average of 20.7 per 100,000 population<sup>3</sup>.

The severity of the opioid crisis has pushed local and state governments to expand Medication Assisted Treatment with evidence showing it may reduce the likelihood of overdose deaths by up to three-fold<sup>4</sup>. Medication Assisted Treatment (MAT) is an evidence-based intervention that uses medications, such as methadone, buprenorphine, and naltrexone, alongside counseling and behavioral therapies to treat substance use disorders, including opioid and alcoholic use disorders<sup>3,5</sup>. Numerous studies indicate that MAT has limited the occurrence of opioid related deaths and overdoses, while reducing cravings and stabilizing physical dependency for patients struggling with addiction<sup>5,6,7</sup>.

Only authorized treatment programs and/or providers can deliver MAT to patients. There are several steps required in order for opioid treatment programs (OTPs) to receive the authorization necessary to administer MAT. These programs must first receive accreditation from the Substance Abuse and Mental Health Services Administration (SAMHSA) and are further certified by SAMHSA's Division of Pharmacologic Therapies to conform to federal regulations. The Drug Enforcement Agency and the Department of Health and Human Services help SAMHSA in overseeing the medications provided in MAT at the OTP<sup>8</sup>. Only OTPs are allowed to prescribe the drug methadone. OTPs have the authority to prescribe buprenorphine or naltrexone without being required to obtain a SAMHSA waiver, which is a step required of

clinicians who practice outside these programs<sup>9</sup>. Patients in OTPs who are receiving MAT must undergo additional counseling, and they are offered other services to help in their recovery<sup>10</sup>.

Under the Drug Addiction Treatment Act of 2000 (DATA 2000), additional authorized clinicians who practice outside of opioid treatment programs received legal authority to prescribe MAT with buprenorphine or naltrexone if obtaining a DATA waiver<sup>11</sup>. For a practitioner to obtain a waiver to practice opioid dependency treatment, they must apply to the Center for Substance Abuse Treatment (CSAT) under SAMHSA. Qualified clinicians must satisfy certain requirements set by SAMHSA, including undergoing certification training before obtaining a DATA waiver to offer MAT<sup>11</sup>. Afterwards, clinicians must upload a certificate showing evidence of training before gaining formal authorization to prescribe or dispense buprenorphine. In order to begin treating up to 100 patients in their first year, the qualifying clinicians must either hold a board certification in addiction medicine or addiction psychiatry. Other physicians who are not in addiction medicine may also provide MAT if they reside in a qualified practice setting<sup>12</sup>. These settings may include, but are not limited to, a physician's office, community hospital, health department, or correctional facility<sup>13</sup>.

When the DATA of 2000 was first passed, only physicians were eligible for the DATA waiver. However, the DATA waiver was later extended to other qualified clinicians under the Comprehensive Addiction and Recovery Act of 2016, which enabled nurse practitioners and physician assistants to also provide MAT<sup>14</sup>. Between 2017 and 2018, buprenorphine dispensing rates have increased, suggesting that an additional supply of clinicians has enabled greater prescribing capacity for those with opioid use disorder<sup>15</sup>.

Although more efforts have been implemented to expand clinicians' eligibility to provide MAT, there still exists a shortage in the availability of providers in many areas. In 2017,

approximately 46.4% of all US counties lacked an authorized clinician to prescribe MATs for opioid use disorders, a situation even worse in rural counties (71.6%)<sup>16</sup>. Over 30 million Americans live in counties without access to a provider for buprenorphine treatment<sup>17</sup>. While the number of waived providers has steadily increased in recent years, over 30% of U.S. counties still do not have a single DATA waived provider<sup>18</sup>. Among those who do have a waiver, over 40% are psychiatrists, and slightly more than a third include primary care specialties of family or internal medicine<sup>17</sup>. However, only 3% of all primary care physicians and 16% of psychiatrists have obtained this waiver, and they are more likely to practice in urban settings<sup>17</sup>. An even more concerning realization is the large shortage of psychiatrists and primary care specialties whom are among the most common to provide MAT. By 2024, the psychiatrist workforce could range from a shortage of 14,280 to 31,091 psychiatrists<sup>19</sup>. By 2035, there will be an estimated shortage of 44,000 primary care physicians<sup>20</sup>. In a public policy statement, the American Society of Addiction Medicine vocalized this concern when stating that “public health demands of substance use and addiction are so extensive that specialists in addiction medicine will never be able to meet all the demand for health care services of this population.”<sup>21</sup> Therefore, the large shortage in waived providers and even larger shortage among the providers who most likely administer MAT, demonstrates the urgency to examine this issue further in one of the most vulnerable states to the opioid crisis: Ohio.

The clinician shortage of eligible providers to treat opioid use disorder also remains an issue with opioid treatment programs. Almost one-third of U.S counties do not have any OUD treatment programs<sup>22</sup>. Among private treatment programs, less than a half offer MAT, and only one-third of opioid dependent patients actually received the treatment<sup>23</sup>. Overall, many states

struggle in providing sufficient treatment capacity for all patient's suffering from opioid use disorder<sup>24</sup>.

Although extensive literature exists presenting the nationwide issue of insufficient treatment capacity, few studies focus specifically on the burden in Ohio despite its acute opioid crisis. Some evidence has been suggestive of accessibility issues in Ohio with 20% of office-based treatment clinicians not actively prescribing and a half of them denying insurance for their services<sup>25</sup>. In contrast, among Ohio specialty treatment programs, almost half of them reported insufficient prescribing capacity<sup>26</sup>. And, among those with insufficient prescribing capacity, half of them had to turn away patients from buprenorphine therapy<sup>26</sup>. This suggests a potential maldistribution of authorized MAT providers that do not match the treatment needs.

Even if all providers operate at full-capacity, Ohio may only be able to treat 20-40% of the entire population abusing opioids or who have developed dependence<sup>2</sup>. Given the current opioid crisis, an inefficient prescriber capacity to deal with this large population raises serious concerns. This demonstrates the importance of gathering knowledge to evaluate how the current supply of DATA providers and OTPs in Ohio meet drug treatment needs. Our study aims to characterize the co-locations of DATA providers and OTPs with the concentrations of drug overdose deaths in Ohio to understand whether potential capacity is available to meet the needs of reducing opioid mortality. The high number of overdose deaths in Ohio emphasizes the importance of this study, which is among the few known to look at both the supply of waived providers and opioid treatment programs. Overall, this information is critical for policy decisions that impact the allocation of state resources, workforce planning, and targeted interventions to reduce disparities.

## **Methods**

### **Data**

Clinician waiver data was obtained from SAMHSA to analyze Buprenorphine Practitioners in Ohio in 2019. Because clinicians have to obtain a certificate from SAMHSA to prescribe MAT, SAMHSA continuously collects and track clinicians in the Buprenorphine Waiver Registration Database and makes the data public. I examined this database with geographic location information. For each county, the database contains the detailed information about practitioners with a waiver, including medical doctors, physician assistants, osteopathic doctors, and nurse practitioners, as well as the name, city, address, and telephone number of each provider. Providers whose addresses were listed but did not specify their county classifications, were manually tracked via ZIP codes and street addresses to identify their county of residence.

Additionally, a list of opioid treatment programs in Ohio were obtained from SAMHSA's opioid treatment program directory. This included accredited programs earning SAMHSA certification, as well as provisional programs still undergoing the full accreditation process<sup>27,28,29</sup>. Physicians within OTPs should have completed an accredited residency program and hold at least 1 year of experience in addiction medicine or psychiatry, while completing training of all the FDA approved medications for opioid use disorder treatment. Multiple providers can practice within an OTP program without having to separately obtain a DATA waiver. However, the OTP must designate between patients who are cared for by a waived physician under the DATA 2000, and physicians who are authorized to prescribe MAT via other credentials<sup>30</sup>.

County-level opioid overdose metrics came from the County Health Rankings and Roadmaps program that compiled drug overdose deaths from the Center of Disease Control's mortality data<sup>31</sup>. The number of drug overdose deaths and drug overdose death rates in each

county were used from 2015-2017, which is based off of a three-year average, the most updated data available during the study period. Additionally, the poverty rate for each county was obtained by the U.S Census Bureau for the period 2019<sup>32</sup>. It is the percent of county population in poverty as defined by the federal thresholds in 2019. Additionally, the population numbers in each county were taken from the U.S Census Bureau from 2018.

### **Study Sample**

A total of 2,147 DATA registered providers were included in the analysis. There were 259 providers in the DATA registry with missing specialties. They were included in the analysis of total waived practitioners for each county. Providers with missing specialty can represent any provider type. We focused on physicians, nurse practitioners (NP) and physician assistants (PA). Medical and osteopathic doctors were combined into one group to represent total physicians.

Moreover, practitioners who were registered under more than one address, such as those practicing in more than one city within the same Ohio county or reported more than once under the same address, were not duplicated and were treated as one provider. For practitioners who practiced in more than one county, they were counted as a separate provider under each county. Additionally, 4 townships in Ohio that were reported with registered providers— Boyd, Cook, Fresno, and Tulsa townships, were regrouped into their respective counties for consistency. Out of 88 Ohio counties, 9 did not report any waived providers: Ashland, Champaign, Harrison, Holmes, Monroe, Noble, Ottawa, Paulding, and Preble. The final analytic sample included 2,075 providers in year 2019.

## **Measures**

Waivered provider density was defined as the number of waivered providers per 100,000 population in a county. We included a provider density measure for both total DATA providers, as well as for each of the three provider types above (physician, nurse practitioner, and physician assistant). Opioid treatment program density was defined as the number of opioid treatment programs per 100,000 population in a county. The opioid burden is based off of drug overdose mortality rates, which is defined as the number of drug poisoning deaths per 100,000 population. The drug poisoning deaths in the numerator were represented by deaths from accidental, incidental, and undetermined drug poisoning for the aggregate annual population over the three-year period from 2015-2017. The absolute number of drug overdose deaths were also utilized as a measure of the opioid burden during robustness analyses. Four counties did not report any drug overdose deaths: Monroe, Morgan, Paulding, and Vinton and were coded as 0 in my analyses.

## **Statistical Analysis**

We conducted a cross-sectional analysis at the county level to examine the correlation between DATA-waived providers and opioid mortality rates, and opioid treatment programs and opioid mortality rates, respectively. We first described the distributions of waivered provider types across all Ohio counties. The waivered provider sample was further examined to identify the number of providers who offered MAT in multiple counties across Ohio. The waivered provider density was calculated for each county and compiled into a histogram distribution to compare density variation across counties.

To gauge whether potential MAT treatment capacity matches the local medical needs, we employed a series of hypothesis tests between measures of the supply of waivered providers and OTPs, and measures of opioid burden and poverty. Pearson correlation tests were applied to test



the correlations between waived provider density, poverty rate, and opioid overdose rates. Pearson correlation tests were further applied to test the correlations between opioid treatment programs, poverty rate, and opioid overdose rates. Strength thresholds picked for the Pearson correlational coefficient (R) are based on a scale commonly cited in the social sciences, which was established by Dancey and Reidy<sup>33</sup>. The following strengths for R are 0 = zero correlation, (+/-) 0.1-0.3 are weak correlations, (+/-) 0.4-0.6 are moderate correlations, (+/-) 0.7-0.9 are strong correlations, and (+/-) 1 is a perfect correlation.

A two-sample unpaired t-test compared the difference in means for OTP density for the counties with the five highest and lowest overdose rates compared to the average OTP density among all other counties. For the robustness analysis, I used a two-sample unpaired t-test to compare poverty rates between counties having the highest and lowest overdose rates. Further sensitivity tests were conducted to describe alternative versions of opioid burden using the absolute number of opioid deaths. A 95% confidence interval was used for all tests.

## **Results**

Figure 1 presents the total sum of all waived providers registered in the Buprenorphine Waiver database by provider type across all counties. Most of the waived practitioners in Ohio were physicians (57%). Twenty-seven percent of waived providers were NPs (27%), followed by PAs (4%). Twelve percent of the practitioners in the database did not specify what type of provider they were, although they did have waivers to prescribe MAT treatment. Only 34% of counties contained opioid treatment programs. There is a total of 80 opioid treatment programs in Ohio. The maximum number of opioid treatment programs observed in a single county was 11, which was seen for Hamilton County.

Table 1 exhibits the number of waived providers who practiced in more than one county. 50 providers listed in the database practiced in more than one county, based on practice addresses in the registry. Among those, 42 practiced in two counties, and 8 practiced in more than two counties. This may indicate that they were serving a bigger geographic region or were locating at the county borders.

Figure 2 displays the distribution of waived provider densities across Ohio counties. The average waived provider density in a county, including all provider types, was 13.90 per 100,000 population (SD 9.9; 95% CI 11.7-16.1). The median was 11.3 per 100,000 among all counties. There was a substantial variation in waived provider density. Waivered provider densities ranged from a minimum of 1.89 per 100,000 to a maximum of 47.89 per 100,000 population (Figure 2). Several counties had over 34.3 per 100,000 waived physicians. These were Allen, Mahoning, Ross, Scioto, and Gallia counties.

In Figure 3, a statistically significant positive relationship was observed between the density of providers and opioid overdose death rates across Ohio counties ( $r(76) = .40, P < .001$ ; 95% CI .19-.57). This effect was moderate. Higher provider densities were correlated with higher overdose rates in a county. This may suggest that providers in high need regions are more likely to obtain waivers. However, the medium correlation also suggests that waived providers do not necessarily co-locate at where the potential patients are.

The correlation between locations of opioid treatment programs and overdose rates were further analyzed (Figure 4). A significant, moderate to weak, positive relationship was observed between the number of opioid treatment programs and drug overdose rates ( $r(76) = .39, P < .001$ ; 95% CI .18-.56). Additionally, poverty rate did not have any significant influence on the abundance of opioid treatment programs in counties ( $P = .18$ ).

Measures in counties with the highest and lowest overdose rates were examined and compared to. Among the counties with the highest overdose burden, poverty rates were higher than the average poverty rate among all counties. The average poverty rate for the highest overdose counties was 16% (SD 1.62; 95% CI 12.81-11.84), which was higher than the state average rate of 12.8% (SD .46; 95% CI 11.84-13.67).

When comparing the waived provider rankings for the highest overdose counties, most did not place in the upper quartile for the highest densities with the exception of Scioto and Montgomery county. This may raise some questions as to whether Clark, Butler, Trumbull and Brown counties, counties with the worse overdose death rates, currently have a sufficient supply of waived providers to meet high overdose burdens. Most of these counties had a higher proportion of physicians than nurse practitioners and physician assistants, which was consistent with the overall sample. Montgomery County had the highest overdose rate in all of Ohio. It possessed a provider density of 26.11 per 100,000 population, which was higher compared to the sample average of 13.90 per 100,000. Scioto County was considered an outlier among all 88 counties for its high waived provider density (Figure 2). All of the highest overdose counties contained opioid treatment programs, and most counties with lower overdose death rates do not have OTP programs.

For counties with the lowest overdose burden, the poverty rates were variable. When a two-sample unpaired t-test was conducted between low overdose counties and all other counties, the mean poverty rates were comparable. The lowest overdose counties had an average poverty rate of 14.09% (SD 1.74; 95% CI 10.62-17.56), and all other counties aggregated had an average poverty rate of 12.8% (SD 0.53; 95% CI 11.69-13.81). When comparing the waived provider rankings for the lowest overdose counties, most placed in the lower third and fourth quartile for

the waived provider densities with the exception of Athens county in the upper quartile. Since these counties had small overdose rates, the lower rankings might reflect a smaller urgency for waived providers in these counties. Morgan and Vinton counties had no overdose deaths, and these counties had no registered physicians, registered physician assistants, or opioid treatment programs. The waived provider densities of Morgan and Vinton, 6.85 and 7.61 per 100,000 consecutively, were lower than the sample average of 13.90 per 100,000 population. Athens was the only county among those with the lowest overdose deaths that had an opioid treatment program (Table 3).

When comparing the mean waived provider densities, the 5 counties with the highest overdose rates had much higher mean provider densities (20.50 per 100,000, SD 4.10; 95% CI 12.32-28.69) than all other counties (13.76 per 100,000, SD 1.24; 95% CI 11.29-16.23). Counties with the five lowest overdose rates had on average lower waived provider densities (9.52 per 100,000, SD 3.51; 95% CI 2.52-16.51) than all other counties (13.76 per 100,000, SD 1.14; 95% CI 11.48-16.03).

A two-sample unpaired t-test displayed a significant difference in the mean OTP density per 100,000 population between the top 5 highest overdose counties and all other counties ( $t(70) = 2.71$ ,  $P = .009$ ; 95% CI .22-1.43). The high overdose counties had an OTP density of 1.24 per 100,000 (SD .29; 95% CI .66-1.82), which was much higher than the mean of 0.41 per 100,000 (SD .09; 95% CI .24-.59) for all other counties. This may suggest that these programs concentrate in counties with higher burdens (Table 2). A two-sample unpaired t-test found no difference in the mean density of opioid treatment programs for the 5 lowest overdose counties compared to all other counties ( $t(71) = -.71$ ,  $P = .48$ ; 95% CI -.77-.36). Lastly, a two-sample unpaired t-test between the highest and lowest overdose rate counties found no significant

difference in the means for poverty rate ( $t(11)=-.47$ ,  $P=.64$ ; 95% CI -11.10-7.20). Therefore, it is likely that poverty did not contribute significantly to any differences seen among the highest and lowest overdose counties.

### **Robustness Tests**

A sensitivity test was employed to vary overdose death rates with the absolute number of overdose deaths to understand if the relationship with total waived provider density held consistent. A significant positive relationship was also found between total waived provider density and the number of overdose deaths across counties ( $r(76) = .31$ ,  $P=.006$ ; 95% CI .09-.50). Although this effect was weaker, a significant correlation further validates a likely positive relationship between the supply of waived providers and opioid burden.

It is possible that providers sought to practice in regions with a higher population income and the areas with high overdose death rates (low incomes) may be impoverished with very few providers. Therefore, in Figure 5, we displayed the relationship between poverty rates and overdose death rates and found a weak significant, positive relationship ( $r(76) = .32$ ,  $P = .004$ ; 95% CI .11-.50). This indicates that poorer counties were slightly more vulnerable to having a higher overdose burden. I also tested the correlation between poverty rate and total waived provider density in Figure 5. This displayed a moderate, positive relationship, indicating that providers may be more likely to obtain a waiver in poorer regions, consistent with our earlier findings ( $r(76) = .46$ ,  $P < .001$ ; 95% CI .26-.62).

A sensitivity analysis aimed to test the consistency of the relationship between opioid treatment programs and opioid burden when substituting overdose rates for the absolute number of deaths. A significant positive relationship was observed between the number of opioid treatment programs and the number of drug overdoses in a county ( $r(77)=.86$ ,  $P < .001$ ; 95% CI

.78-.91). This effect was strong, and even stronger compared to overdose rates. The correlation heavily indicates for more opioid treatment programs to concentrate in counties having the largest absolute number of deaths from opioids with a smaller emphasis on the total county population.

## **Discussion**

The opioid crisis has significantly impacted Ohioans with Ohio standing among the top five states for the highest opioid mortality rates. This has important implications for estimating if Ohio has sufficient treatment capacity to reduce deaths related to opioids. Additionally, with newer evidence that many addiction treatment centers are possibly facing financial collapse<sup>34</sup>, and other estimates that Ohio may only be able to treat 20-40% of the entire population abusing opioids or who have developed dependence<sup>2</sup>, this study may establish the need for further funding to expand treatment capacity.

The results of this study also offered newer evidence of Ohio's substance abuse treatment infrastructure. A positive association was discovered between waived provider densities and opioid overdose rates. This implies that given the higher disease burden in a county, more providers in that area likely obtained waivers to respond to the opioid burden in their county and expand capacity to provide treatment. Moreover, our results indicated that opioid treatment programs are more likely to be located in counties having the largest number of opioid related deaths. These results are consistent with national literature that documented a positive correlation between areas of greater treatment capacity and higher indicators of the opioid crisis<sup>18</sup>. Our study found that the average waived provider density was 13.90 per 100,000 population. Other literature found national estimates for buprenorphine practitioner densities to be close to 14.3 per

100,000 persons<sup>35</sup>. This estimate puts Ohio lower in provider supply compared to other states, which demonstrates sufficient room for improvement to expand the provider supply in Ohio.

County-level variability was demonstrated within our results between treatment capacity and disease burdens. A moderate, positive relationship between waived provider supply and overdose rates suggested providers in high burden counties were more likely to obtain a waiver. However, we found that in counties with the highest overdose rates, their provider densities did not rank top within Ohio. This likely indicates that providers did not locate where the highest needs are. This mismatch implies that having a high opioid burden may influence waived providers to obtain waivers in their county, but it doesn't strongly push providers to move and practice in these vulnerable regions. Therefore, this may demonstrate a potential shortage in MAT prescribers to address the high opioid mortality rates in these counties. Moreover, this study may reaffirm that each county has its own discrepant profile of overdose mortality and provider density. Substantial county-level maldistributions between the availability of buprenorphine providers and the burden of opioid overdose deaths have been witnessed on a national level in literature<sup>36</sup>. Therefore, it is important to consider other factors that may explain some of this incongruity between provider supply and deaths.

Lastly, our results indicated that most waived practitioners in Ohio were physicians, despite enactment of the 2016 Comprehensive Addiction and Recovery Act expanding prescribing capacity to include Nurse Practitioners and Physician Assistants.

Across all counties, poverty rate had a weak, significant positive correlation with overdose opioid mortality rates. No significant difference in poverty rates were found between the highest and lowest overdose rate counties. However, this finding may have been limited to the effect of small sample sizes. Therefore, the significance of poverty rate in this study may

imply that poverty slightly increases the risk of being a high overdose county. This is consistent to other literature demonstrating that opioid fatality is associated with factors of low socioeconomic status, including poverty<sup>37</sup>.

The results of this study have implications for future policy. The lower supply of nurse practitioners and physician assistants as waived providers suggests potential in expanding this supply of providers to provide medication assisted treatment. Evidence in other literature indicate that almost 37% of physician assistants and nurse practitioners report treating no patients<sup>38</sup>, and that sufficient time with patients and a lack of institutional support remains a concern for physicians<sup>39</sup>. Additional initiatives to encourage nurse practitioners and physician assistants to obtain a waiver may increase prescribing capacity among treatment programs and give additional time and support to both physicians and patients.

Additionally, a medium correlation between waived providers and opioid overdose mortality rates may represent that waived providers don't necessarily practice where patients are in the most need. This trend could help inform future city planners and health systems to place a higher emphasis on these high need regions when implementing new treatment programs and allocating funds. Moreover, the weak positive correlation between poverty rates and opioid deaths, along with county-level differences between burden of opioid deaths and waived provider supply, demonstrate the presence of different mechanisms producing variabilities in opioid deaths. Each county seems to possess a different profile, and this variability should be accounted for by providers and hospital systems when focusing on population health.

Community level initiatives to alleviate substance abuse should be differentiated in ways to best serve their counties, as there doesn't seem to be a one size fits all approach.



## **Limitations**

There are five limitations worth noting in this study. First, the SAMHSA buprenorphine practitioner database is the most comprehensive source publicly available, but it is not entirely complete. Some providers in the database don't agree to make their information public in the database and are not necessarily included in the final list. This could potentially underestimate the supply of providers able to offer medication assisted treatment, and therefore, impact the total waived provider densities for each of the counties.

Second, the accuracy-of the SAMHSA Provider database is another data limitation. The missing values in provider type for some providers in the database is a challenge to describe provider demographics.

Further, listed waived providers do not warrant health care availability. In fact, earlier literature indicated that within a cohort of providers in the SAMHSA database who didn't have appointments available, 32.9% could not be reached and 37.5% of the numbers were incorrect<sup>40</sup>. The extent of the inaccuracies within waived providers in Ohio is unknown, though inconsistencies is likely to affect health outcomes, including mortality rates, if those are unable to receive care.

An analysis of a cohort of providers within the SAMHSA database found that out of 505 providers, 72.3% did not have appointments available<sup>40</sup>. The assumption that those who had waivers all prescribed treatment is also likely to complicate results. One survey of Ohio Specialty Treatment Organizations found almost 48.3% reported insufficient prescribing capacity<sup>26</sup>. Prescribing capacity may be due in part to the waiver restrictions on providers with prescribing capacities limiting the amount of prescriptions to 30, 100 or 275 patient limits per month. One study characterizing Ohio office-based physicians participating in office-based

therapy found that nearly one in five of listed physicians are not active office-based therapy prescribers<sup>25</sup>. Therefore, a supply of providers as implicated within the database, doesn't automatically translate to administering treatment.

Moreover, individuals may also seek care within different counties. Thus, they may be counted apart of the population in counties that they don't actually seek care. It is also likely that overdose death rates are underreported. Some researchers have found that as many as 70,000 opioid overdose deaths were unreported or misclassified between 1999 to 2015 due to how these overdoses were reported on death certificates<sup>41</sup>. This may compromise the overall death rate in counties and the actual correlation with provider supply.

Lastly, a supply of providers and treatment programs does not directly translate to a reduction in opioid overdose mortality. Many factors diverge in the pathway from treatment availability to health outcomes that were not extensively explored in this study. Even if an opioid treatment program is present in a county, barriers may deter those to seek care. Among a survey of waived Ohio physicians practicing in office-based settings, one in two active prescribers did not accept insurance for office-based therapy<sup>25</sup>. For patients never receiving treatment, primary reasons for not seeking help include unreadiness to stop using the drug (40%), health coverage and cost barriers (34%), job discrimination (12%), and fears of community opinions (11.6%)<sup>42</sup>. Even if patients successfully access treatment, attrition under buprenorphine is close to 50-60% around 12 months and 40-50% at six months. Methadone patients experience similar rates as 40-60% have left within 12-14 months<sup>43</sup>. Not staying the course of treatment may exacerbate the chance of relapse and possible opioid related mortality. Therefore, even if there is an abundant supply of providers, addiction itself proves a huge challenge. For many individuals, the struggles related to stigma, making the step to asking for help, treatment compliance, social interactions,

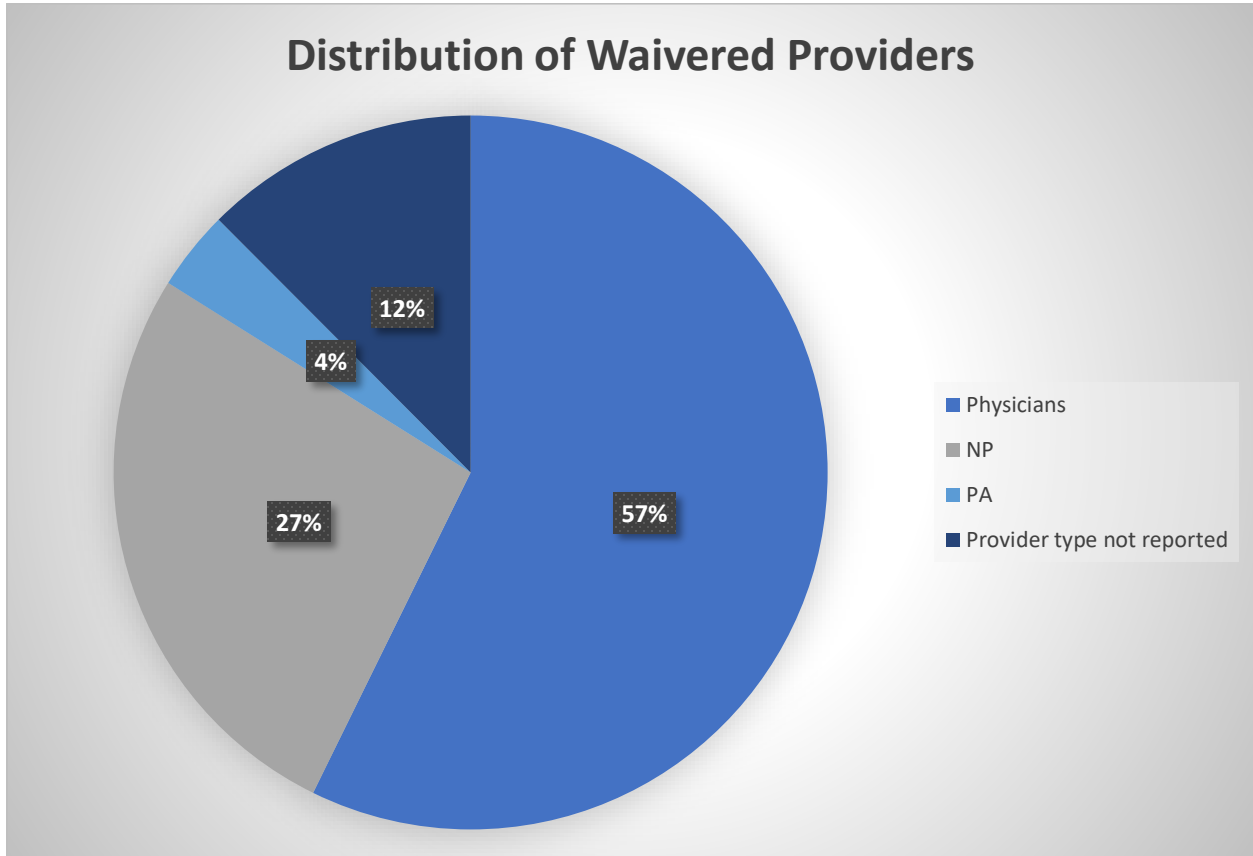
and stressful experiences may outweigh an abundant supply of resources and complicate the path to recovery, which all play a role in the variation seen between provider supply and opioid deaths.

## **Conclusion**

Overall, there was a medium positive correlation between the provider densities and opioid overdose mortality rates within Ohio counties. This likely suggests that providers residing in high opioid mortality regions were more likely to obtain waivers. Though, the medium correlation may still suggest an inadequate workforce supply to respond to these high opioid burdens. The county-level variations between waived providers and opioid burdens further demonstrates this. A strong positive relationship was identified between opioid treatment programs and the number of drug overdose deaths in counties. Evidence of this may indicate these programs do tend to locate to where high opioid burdens occur. Poverty rates had a weak positive correlation to opioid overdose mortality rates and did not significantly differ between counties with the highest and lowest overdose rates compared to all other counties. An overall moderate, positive relationship between waived providers and poverty rates suggest that providers may be more likely to obtain a waiver in poorer regions. The average waived provider density was 13.90 per 100,000, and only 34% of all counties contained opioid treatment programs. Additionally, although the Comprehensive Addiction and Recovery Act expanded prescribing capacity to include Nurse Practitioners and Physician Assistants, physicians still represent the majority of waived providers in Ohio.

## References

**Figure 1: Distribution of Waivered Provider Types.**

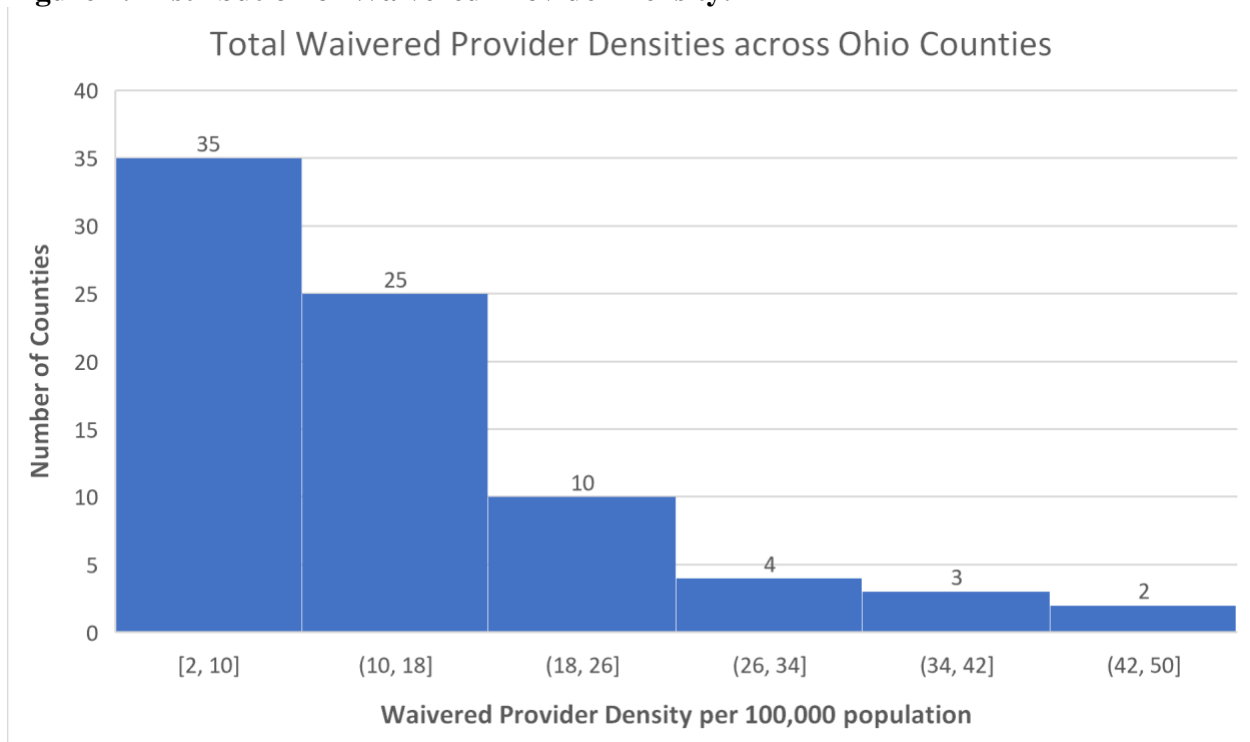


The total sum of all waived providers registered in the SAMHSA Buprenorphine Waiver database by provider type across all counties.

**Table 1: The Number of Providers Who Practiced in More Than One County with Waivers.**

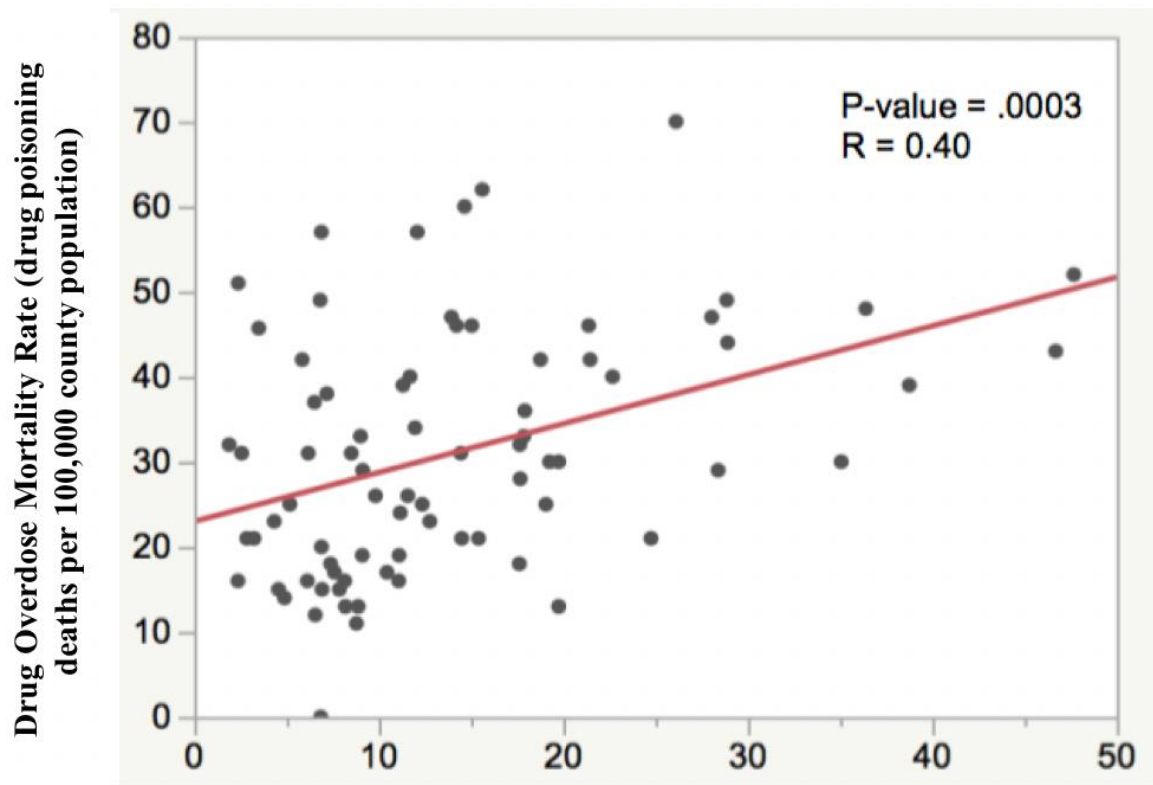
Number of Counties Practiced At	Number of providers who practiced in more than one county
2 counties	42
3 counties	6
4 counties	1
5 counties	1
Total	50

**Figure 2: Distribution of Waivered Provider Density.**



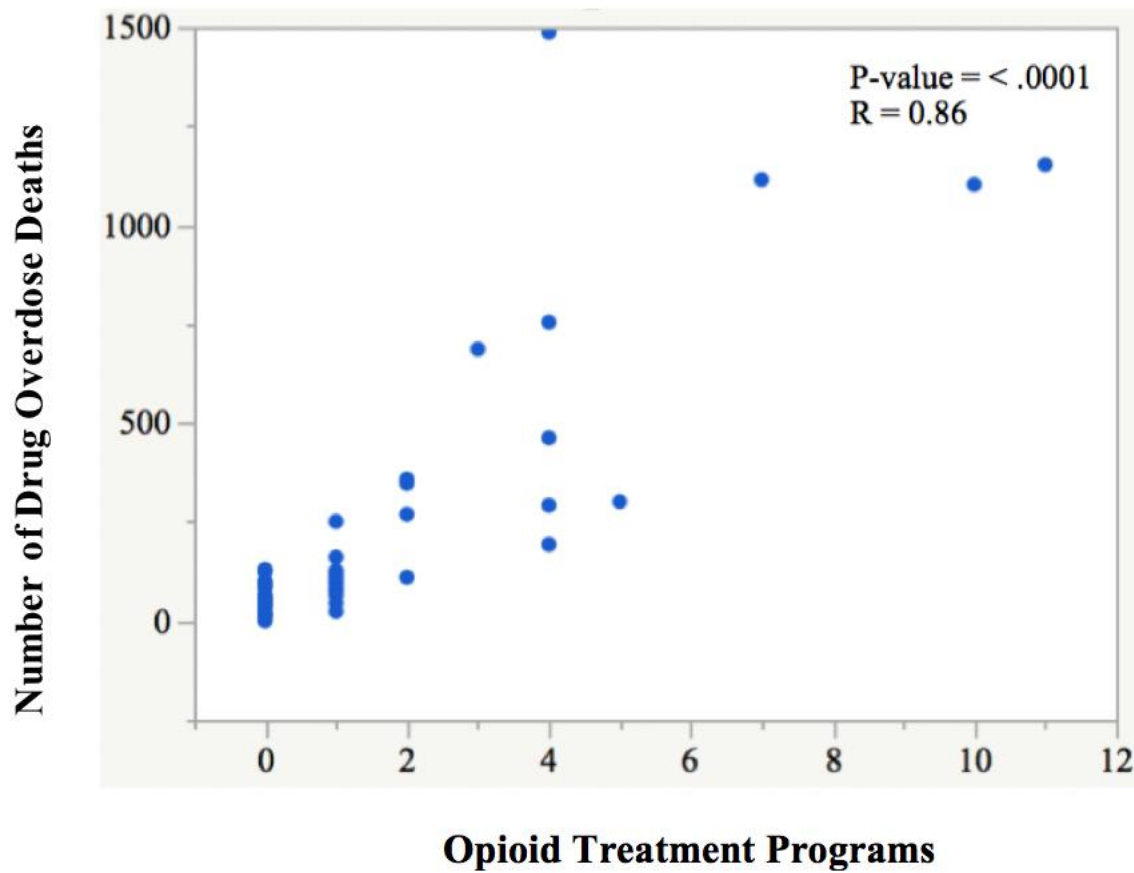
The numbers in the brackets of the horizontal axis represent the waived provider densities with a standard bin width of 8 waived providers per 100,000 population. The numbers on top of the bars represent the number of counties whose waived provider density fell within that range.

**Figure 3: Correlation between Drug Overdose Mortality Rate and Total Waivered Provider Density for Ohio Counties.**

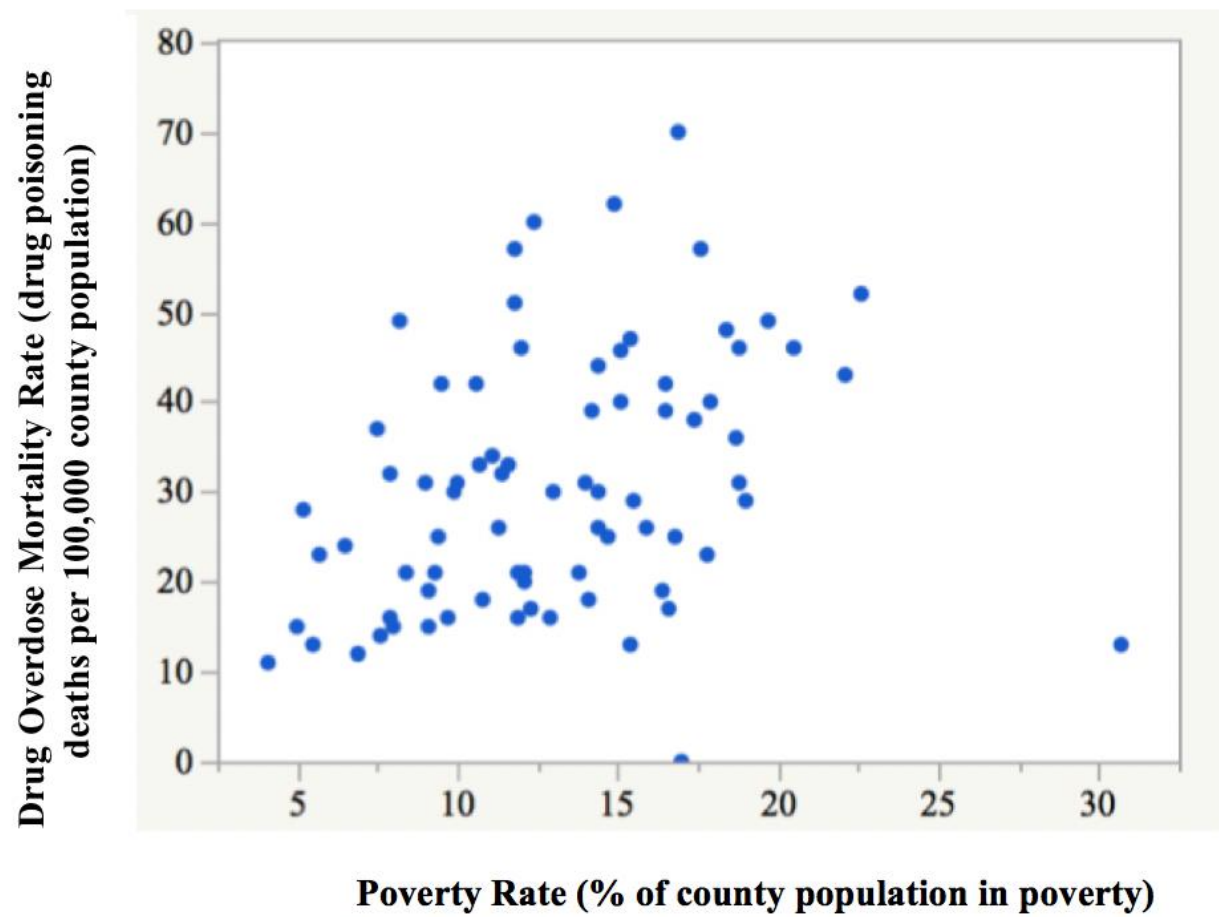


**Total Provider density (Waivered providers per 100,000 county population)**

**Figure 4: Correlation Between Overdose Death Numbers and The Number of Opioid Treatment Programs for Ohio Counties.**



**Figure 5: Correlation Between Drug Mortality Rates and Poverty Rates Across Ohio Counties.**





**Table 2: Waivered Provider and OTP Densities for Ohio Counties Having the Highest Overdose Rates.**

Counties with the 5 Highest Drug Overdose Rates	Overdose Death Rate	Poverty Rate (%)	Total Waivered Provider Density	Waivered Provider Density Ranking*	Waivered Physician Density	Waivered NP Density	Waivered PA Density	OTP Density
1) <b>Montgomery</b>	70	16.9	26.11	10	13.52	7.33	1.31	1.31
2) <b>Clark</b>	62	14.9	15.60	25	8.17	3.72	2.23	0.74
3) <b>Butler</b>	60	12.4	14.65	28	8.11	5.75	0.78	0.78
4) <b>Trumbull</b>	57	17.6	12.08	35	7.55	3.52	0.50	1.01
<b>Brown</b>	57	11.8	6.88	61	2.29	4.59	0.00	2.29
5) <b>Scioto</b>	52	22.6	47.68	1	25.16	21.19	0.00	1.32

\*The waived provider ranking assigns each county in order of the highest to lowest waived provider densities. A score of 1 represents the highest density, and a score of 88 represents the lowest density.

**Table 3: Comparison Between the Provider Densities for Ohio Counties Having the Lowest Overdose Rates.**

Counties with the 5 Lowest Drug Overdose Rates	Overdose Death Rate	Poverty Rate (%)	Total Waivered Provider Density	Waivered Provider Density Ranking*	Waivered Physician Density	Waivered NP Density	Waivered PA Density	OTP Density
1) <b>Morgan</b>	0	17	6.85	62	0	6.85	0	0
2) <b>Vinton</b>	0	19	7.61	55	0	7.61	0	0
3) <b>Delaware</b>	11	4.1	8.79	50	7.32	0.49	0.49	0
4) <b>Auglaize</b>	12	6.9	6.55	64	2.18	2.18	2.18	0
5) <b>Putnam</b>	13	5.5	8.89	49	5.92	2.96	0	0
<b>Coshocton</b>	13	15.4	8.19	52	5.46	2.73	0	0
<b>Athens</b>	13	30.7	19.75	16	13.67	4.56	0	1.52

\*The waived provider ranking assigns each county in order of the highest to lowest waived provider densities. A score of 1 represents the highest density, and a score of 88 represents the lowest density.

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